# 6.1.3 Classwork

Name_____ Date_____

What can I do with inverses?
Finding inverses and justifying algebraically

**today's big goal** You'll use your ideas about switching x & y-values to learn how to find an inverse algebraically. You'll also learn about compositions of functions and how to use them to test if two functions are an inverse of each other.

**6-38** **Have a member of your group read each of the instructions below!**

Consider the table below right.

a. Write an equation for the relationship represented in the table.

**Equation: _____**

b. Make a table for the inverse:

| $x$ | $y$ |
|---|---|
| 1 | −5 |
| 3 | 7 |
| 5 | 19 |
| 7 | 31 |

c. How are these two tables related to each other? Be specific! Find different ways to express your answer.

d. Use the relationship between the tables to find a shortcut for changing the equation of the original function into its inverse.

e. Now solve this new equation for $y$.

f. **Justify** that the equations are inverses of each other (recall how we've done this in previous activities).

6-39 **Have a member of your group read instructions below!**

Find the inverse function of the following functions using your new algebraic method, clearly showing all your steps. **Use a "Rally Coach" study team strategy:**

- Student writes what Coach explains. Coach cannot write at all.
- Then the roles are reversed for the next problem.
- Each pair checks their work with the other pair in your group.
- Repeat for questions c & d.

a. Student: _____ Coach: _____

$$y = 2(x-1)^3$$

b. **Switch roles!**
Student: _____ Coach: _____

$$y = \sqrt{x-2}+3$$

Before moving on, check a & b with the other pair in your group!

c. Student: _____ Coach: _____

$$y = 3\left(\frac{x-9}{2}\right)+20$$

d. Student: _____ Coach: _____

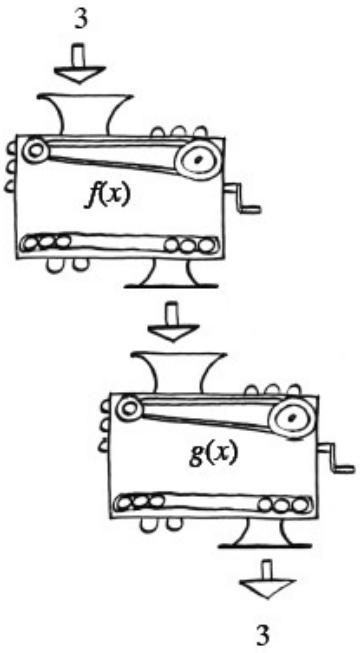
$$y = \frac{4}{3}(x-1)^3+6$$

**6-40** **Have a member of your group read instructions below!**

Adriena's **strategy** for checking that the functions $f(x)$ and $g(x)$ are inverses is to think of them as stacked function machines:

- She starts by choosing an input to drop into $f(x)$.
- Then she drops the output from $f(x)$ into $g(x)$.
- If she gets her original number, she is pretty sure that the two equations are inverses.

a. Is Adriena's **strategy** sufficient? Is there anything else she should test to be sure?




**b.** With your team, select a pair of inverse equations from problem 6-39, name them $f(x)$ and $g(x)$, **then use Adriena's ideas to test them.**

*f(x)* = _____ *g(x)* = _____

c. Adriena wants to find a shortcut to show her work. She knows that if she chooses her input for $f(x)$ to be 3, she can write the output as $f(3)$. Next, $f(3)$ becomes the input for $g(x)$, and her output is 3. Since $f(3)$ is the new input for $g(x)$, she thinks that she can write this process as $g(f(3)) = 3$. Does her idea make sense? Why or why not?

d. Her friend, Cemetra thinks she could also write $f(g(3))$. Is Cemetra correct? Why or why not.

e. Will this **strategy** for testing inverses work with any input? Choose a variable to use as an input to test with your team's functions, $f(x)$ and $g(x)$.

**6-41** **Have a member of your group read instructions below!**

Christian, Adriena's teammate, is always looking for shortcuts. He thinks he has a way to adapt Adriena's **strategy**, but wants to check with his team before he tries it. "*If I use her strategy but instead of using a number, I skip a step and put the expression* $f(x)$ *directly into* $g(x)$ *to create* $g(f(x))$*, will I still be able to show that the equations are inverses*?"

a. What do you think about Christian's changes? What can you expect to get out?

b. Try Christian's idea on your team's equations, $f(x)$ and $g(x)$.

c. Describe your results.

d. Does Christian's **strategy** show that the two equations are inverses? How?